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ABSTRACT

Preventive medical care, morbidity, and mortality among children of migrant agricultural workers were examined using a 1978 representative sample of 145 migrant married women under the age of 50 in Wisconsin. Findings showed fewer than 50% of migrant children under age 16 received recommended annual physical examinations. Only 33% received an annual dental checkup as compared to 50% of children in the total United States population. A comparison between levels of chronic health conditions for migrant children and those reported for children in a national survey suggested that incidence of chronic conditions was several times greater among migrant children. Younger children were more likely to receive checkups, while older children were more likely to receive immunizations. After controlling for the child's age, no significant association was found between preventive care and any characteristics of the mother. Mothers who spoke English were more likely to report that a child had a chronic condition. The level of mortality was proportionately lower among women who spoke English and higher among those who gave birth to a low birth weight child. The most important characteristic related to loss of children was whether or not a mother smoked. (NEC)

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PREVENTIVE MEDICAL CARE, MORBIDITY, AND MORTALITY AMONG CHILDREN OF MIGRANT FARM WORKERS

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Preventive Medical Care, Morbidity, and Mortality Among Children of Migrant Farm Workers

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ABSTRACT

This research examines preventive medical care, morbidity, and mortality among children of migrant agricultural workers using a representative sample of migrant families in Wisconsin. Our findings support the view that this group is at substantially greater risk of health problems and early mortality than the general population. Fewer than half of migrant children under age 16 received the recommended annual physical checkup. Only one-third of migrant children under age 16 had received an annual dental checkup compared to 50 percent of children in the total population. A rough comparison between levels of chronic health conditions for migrant children and those reported for children in a national survey suggest that the incidence of chronic conditions is several times greater among migrant children. Childhood mortality appears to be 1.6 times higher than in the U.S. population.

In analyzing variation in preventive care for migrant children, younger children are more likely to receive checkups, while older children are more likely to receive immunizations. In interpreting this finding, we suggest distinguishing between two types of preventive care: one under the direct control of the family, and the other controlled by the schools. Since immunizations are given to migrant children in schools, the older or school-age children are more likely to be immunized.

In assessing reports of chronic conditions, we noted that mothers who spoke English were more likely to report that a child had a chronic condition. One possible interpretation is that women who do not speak English may not label various childhood conditions as chronic illnesses. Since a substantial proportion of women spoke only Spanish, the chronic conditions may be substantially under-reported among migrant children.

The analysis of childhood mortality shows the level of mortality to be proportionally lower among women who spoke English, and higher among those who gave birth to a low birth weight child. But surprisingly, the most important characteristic related to loss of children was whether or not a mother smoked. Using smoking as one example of high risk behavior, we suggest that future studies should give closer attention to the impact of parental risk-taking behaviors on childhood morbidity and mortality experiences.

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Preventive Medical Care, Morbidity, and Mortality Among Children of Migrant Farm Workers

BACKGROUND

Introduction

One segment of rural society that has always been among the lowest in health status, earnings, job security, educational attainment, and political power is the migrant agricultural worker (Shenkin, 1974; U.S. Senate, 1970). Our focus in this paper is specifically on health status of children of migrant agricultural workers in Wisconsin. This paper examines the utilization of preventive health care, the incidence of chronic disease, and mortality among children of migrant women.

Children of migrant farm workers are a distinct high risk population not identified in standard mortality or health statistics. Vital registrations such as birth certificates do not list occupation of parent, and rarely list the ethnic background of the child. In national interview surveys such as those conducted by the NCHS, the demographic data obtained cannot identify migrant farm workers and, even if they were detailed enough to do so, the small proportion in the national population precludes obtaining a sample large enough to be representative. Thus, the only way to obtain data for this special population is with a sample survey. Such a sample survey was conducted in Wisconsin in 1978.

Sample of migrant women

Over 90 percent of the migrant farm workers who travel to Wisconsin are of Hispanic heritage, with about half of them born in Mexico and half in the United States. They travel over 4,000 miles from the Rio Grande Valley in Texas each year in pursuit of employment. The number of migrant workers employed in Wisconsin peaked at about 20,000 in the mid-1950s and has been declining since, due primarily to the development of mechanical harvesters and herbicides (Slesinger and Muirragui, 1981). In 1978, Wisconsin had about 4,100 migrant workers, plus an additional 2,500 nonworkers. Of the 6,600 migrants, about 2,800 were women of childbearing age, and three out of four of these women were employed full time in agricultural work.

In 1978, a 10 percent random sample of all workers was obtained from every employer in the state known to employ migrant workers. This list was obtained from the Job Service unit of the Wisconsin Department of Industry, Labor and Human Relations; their personnel were familiar with local farmers, producers, and processors. Details of the sampling methodology are described in Slesinger and Cautley (1981). Of the 262 workers interviewed in the 10 percent random sample, 46 were married women under age 50. An additional 99 married women living in the households of sampled workers were interviewed.[1] The interview included a schedule designed specifically for married female respondents under age 50. A total of 145 married women were interviewed with this special schedule during the 1978 planting and harvesting season.

Characteristics of the Women

About one-third of the migrant women in the childbearing years were 15-29 years old, 30 percent were in their thirties, and 37 percent were in their forties. This is a relatively old population of childbearing-age women compared to a sample of American women (U.S. Bureau of the Census, 1979). Over three-fourths of the migrant women were wives of the head of the household, with the remainder being children of the head or married to the children of the head. Seven percent were women who headed their own households.

Their educational attainment was low. Six percent had never attended school, and 29 percent had completed four or fewer years of schooling. Thus, using the federal government's definition, 35 percent of the women were functionally illiterate. The educational attainment of the women aged 30 and older was poorer than that of the younger women; 45 percent of the older women were functionally illiterate compared to only 15 percent of the younger women. Three percent of the older women had graduated from high school compared with 12 percent of the younger group.

Spanish was the primary spoken language for 84 percent of the women. Of those, 13 percent were unable to write Spanish. About half of the women spoke only Spanish, and half spoke both Spanish and English. Spanish monolingual women were older, on the average, than bilingual women.

Of the 145 women interviewed, 132 had experienced between one and fifteen live births. They had given birth to a total of 629 children, excluding stillbirths. Approximately half of the children were male and half were female. In striking contrast to the national norm, over 35 percent of the births had not occurred in a hospital. However, a smaller proportion (5.6 percent) than the national average (6.9 percent) weighed

less than 2500 grams at birth (NCHS, 1983).

The average number of births for all women at the time of the interview was 4.3. Women aged 15-29 averaged 1.7 births compared with 5.7 for women 30-49. Migrant women who spoke only Spanish had borne one more child on the average than women who were bilingual (5.3 compared to 4.0). About one-third of the women both under and over 30 had borne their first child before they were 19 years old.

PREVENTIVE MEDICAL CARE AND MORBIDITY

The first topic examined in this paper concerns the medical care of children who traveled with their parents. Of the 145 married women under age 50 who were interviewed, 118 had one or more children under age 16 living in Wisconsin at the time of the survey. These 118 women had a total of 330 children under 16 living and traveling with them. We will examine the children in four age groupings: under 3, 3 to 5, 6 to 11, and 12 to 15. The children were distributed evenly by age with about 5 to 6 percent at each year of age through 11 and age 15, and about 8.5 percent at 12, 13 and 14. This could be due to the fact that children are permitted to work in the fields at age 12, which may encourage families to bring older children along to work. Half the children were boys and half girls.

Measures of Preventive Health Care

Three measures of preventive care were analyzed: whether or not the child had received a set of immunizations; whether or not the child had received a well checkup in the past year; and whether or not the child (age 3 or older) had seen a dentist in the past year.

Immunizations. The mothers were asked whether their children had received the following immunizations: diptheria, pertussis, tetanus (DPT); polio; red measles; rubella; smallpox; and mumps. They also were asked if each child had received a skin test for tuberculosis. Table 1 indicates the percent of children immunized by age of child. Children 3 years of age and older have higher levels of immunization than younger children. As immunization is a cumulative process, older children obviously have greater exposure to the likelihood of being immunized. In addition, some immunizations (e.g., mumps) were not recommended before 2 or 3 years of age. But the dramatic increase at age 3 to 5 years suggests that other factors are also operating. In special migrant education classes, children are frequently exposed to immunization clinics conducted by public health officials. Children who are too young for these classes or for regular schooling would miss the opportunity to be immunized. Thus, the high levels of immunization at older ages may represent a measure of success in public immunization programs.

Data from Wisconsin's Division of Health for this period indicate that immunizations for children entering kindergarten in fall 1978 ranged from 86% immunized for polio to 92% immunized for measles and for rubella (Wisconsin Division of Health, 1984).[2] Migrant children ages 3 to 5 have immunization levels for DPT, polio, measles, and rubella that are roughly comparable to kindergarten children in the state. But migrant children have lower levels of immunization for mumps. (Smallpox vaccinations have been largely discontinued with the eradication of smallpox.)

If we calculate the proportion of children who had received all six immunizations and tests (eliminating children under age 2), we see in Figure 1 that the proportion increases from 55 percent for the preschoolers to 75 percent for the older children. About 90 percent of the children age 3 and older have been immunized for DPT and Polio (Figure 2).

Checkups. Mothers were asked when each child had last received a well checkup. Pediatricians recommend yearly checkups and, as shown in Table 2, this is experienced by only half of the children under 12 and one-third of the children 12 to 15. In addition, Table 2 indicates that about one out of five children in each age level had never received a physical examination when well.

Dental Visit. Dental care is another important component of preventive care for young children. In this population of children, one-third had never visited a dentist. If we remove the 20 children under age 1, this proportion drops to 29 percent. Table 3 displays the length of time since last dental visit by age of child. It appears that the older the child, the less frequent the dental visits. The migrant children sample may be compared with a national sample of children (last column in Table 3).

After adjusting for the larger proportion of "don't knows" in the migrant sample, a smaller percent of children of migrant women than of all children have visited a dentist within the last year (38.0 percent versus 50.4 percent). A larger percent of the migrant children than of all children have visited a dentist on a less than yearly basis (24.6 percent versus 19.0 percent) or have never visited a dentist (37.3 percent versus 30.6 percent). While this is a crude comparison because the age distributions for the two samples may differ, it does appear the migrant

children receive less dental care than other children.

National research has indicated that there is a strong inverse relationship between a child's dental care and family income (USDHEW, 1978:169). This is similar to findings based on adults (Slesinger, 1979b). We suggest that this is an important factor in explaining lower levels of dental care in the migrant population.[3]

Measures of Childhood Morbidity

The second topic to be examined concerns the level of illness among the children of migrant farmworkers. Two items were used from the mothers' retrospective histories: incidences of hospitalization for each child within the past year, and presence of one or more chronic conditions.

Hospitalization. About 7 percent of the children under age 16 (N=23) had been hospitalized during the year preceding the interview. This is very similar to 5.1 percent of children under age 17 who had been hospitalized during the previous year, as reported in a national survey (NCHS, 1982:26). The reasons for hospitalization of migrant children covered a wide range, including respiratory illnesses, surgery, fractures, injury, and gastrointestinal illness.

Chronic conditions. Thirty-six out of 330 children (10.9 percent) were reported by their mothers as having some type of chronic health condition. Four specific conditions were asked by the interviewer: trouble hearing, trouble breathing, heart trouble, and rheumatic fever. Other conditions were volunteered by the mothers. Table 4 lists all of the specific conditions.

In the National Health Interview in 1969-70, only 3 percent of the children under 17 had activity limited by a chronic condition (USDHEW, 1978). Although this figure is not directly comparable to the migrant data because migrant mothers were not asked if the chronic condition limited their child's activity, the types of conditions mentioned in the national survey were similar to the migrant's conditions. The most prevalent conditions in the national survey were respiratory problems (asthma, bronchitis, hay fever, etc.), heart conditions, and hearing impairments (USDHEW, 1978:8). Once again, the national data indicated that "...the lower the family income, the more likely it was that a child's activities would be limited due to a chronic condition " (USDHEW, 1978:8).

Analysis

To further assess health status among migrant children, zero order associations of morbidity and preventive medical care measures with child and maternal characteristics are examined (Table 5). Morbidity was measured by whether a child had one or more chronic conditions. Measures of preventive care included: 1) whether a child had a well checkup in the past 12 months; 2) whether each child age 3 and older had a dental examination in the past 12 months; 3) whether each child age 2 or older had received five immunizations and a TB test; and 4) whether each child, regardless of age, had received DPT and polio immunizations.

The zero order correlations indicate that reports of chronic conditions do not associate with the age or sex of a child. Nor do a mother's age or education relate to chronic conditions of a child. However, such conditions are more likely to be found, or at least reported, for children with mothers who understand English. This may simply reflect

an ability to recognize illnesses and/or to label them with medical terminology.

Turning to preventive care, younger children and children with younger mothers are more likely to have had dental and physical checkups in the last year. In this sample, mother's and child's age are highly correlated ($r = 0.61$), so that neither has a significant partial correlation with either type of checkup. The lack of an association of checkups with the sex of the child indicates that boys and girls are equally likely to receive this type of preventive health care. Neither a mother's education nor her ability to comprehend English is associated with whether a child receives an annual dental or physical checkup.

In contrast to checkups, it is the older children and children with older mothers who are more likely to be completely immunized. Again, the high correlation between these age characteristics eliminates a significant partial correlation with complete immunizations. The lack of association between sex of a child and immunizations indicate an equal likelihood for boys and girls to be immunized. Mother's education is not related to receiving immunizations. And while her ability to understand English is modestly related to whether a child receives the DPT and polio immunizations, it is not related to whether a child is fully immunized.

Finally, it is interesting to note that while receiving a physical checkup is related to having a dental exam ($r = 0.39$), being immunized is not related to physical checkups, and has a small negative correlation with dental exams ($r = -.09$). The main conclusion that we draw from this set of relationships is that obtaining health examinations and obtaining immunizations are two distinct types of preventive health care behavior for migrant children.

CHILDHOOD MORTALITY

In this section, childhood mortality is analyzed using retrospective fertility histories of migrant women. Two substantive questions are addressed: 1) How does the level of childhood mortality in migrant families compare to childhood mortality within the U.S. population generally? 2) What are the determinants of childhood mortality among migrant women?

The childbearing histories of 132 mothers between the ages of 15 and 49 record the births of 629 children, excluding stillbirths. Thirty-three of these children died between birth and age 10 with over half the deaths occurring before the child's first birthday.

Research on infant and childhood mortality in the U.S. typically relies on registration data (Shapiro et al., 1968; Gortmaker, 1977; Slesinger and Travis, 1975), or registration data in combination with survey data from hospitals and funeral directors (e.g., National Center for Health Statistics' Infant Mortality Survey, 1981). By comparison, retrospective survey research is more typical of studies in less developed countries which lack adequate registration systems (Farah and Preston, 1982). But retrospective surveys may also offer an alternative approach to childhood mortality analysis in developed countries when the research focuses on selected segments of the population which cannot be easily identified in the registration system (e.g., migrant agricultural workers).

Several methodological concerns are associated with the use of retrospective surveys to study infant and childhood mortality in selected segments of the U.S. population. The following limitations of this study help to identify some of these issues.

First, an investigation of childhood mortality requires large samples, because mortality is a relatively rare event. Large samples are necessary to provide confidence in the estimates of age-specific mortality as well as to conduct multivariate analyses of the determinants of mortality. A sample of 132 mothers with 629 children is somewhat small for multivariate analysis of childhood mortality.

Second, mortality studies of selected subpopulations should be complemented by comparable information on the general population. For example, the sampling framework for this survey includes migrant workers in Wisconsin. Lacking comparable data on a sample of non-migrant families, analysis of the determinants of mortality is necessarily limited to the variation of mortality experience among migrants. However, this limitation may be partially offset by using national data for comparison. Through the use of U.S. and model life tables, the level of childhood mortality in our migrant sample will be compared to childhood mortality in the total U.S. population.

Third, these survey data share the problem of recall that characterizes retrospective survey research (Haaga, 1981). In the case of childbearing histories, the problem of recall is especially important in accurately reporting the actual age at death of a child. This problem is discussed below.

In examining the level of mortality, age-specific and cumulative mortality probabilities are examined from birth to 5 years of age. The numbers of deaths to children age 5 and over were so small that analysis was not feasible. This analysis is supplemented by Coale and Demeny's (1966) model life tables to yield a better estimate of infant mortality, given the small sample and inaccuracies in recalling exact age at death of

children. Mortality levels in the sample are compared to the U.S. population through use of period life tables created by the National Center for Health Statistics. Death rates for the sample are calculated using the SPSS statistical package "survival" program.

In analyzing the determinants of childhood mortality, methods developed in research on incomplete data for less developed countries will be used (Trussell and Preston, 1981). These include creating a mortality index for each mother, and assessing its determinants with weighted least squares regression. These methods are described further in the analysis.

Comparison of Migrant and U.S. Childhood Mortality Rates

The first column in Table 6 presents the cumulative mortality probabilities for ages 1, 2 and 5 calculated for the sample of migrant children. Table 6 indicates that 29 out of 1000 migrant children die in infancy, and 45 out of 1000 die by the age of two. The cumulative mortality rate by age five is 46 deaths per 1000 children.

As indicated earlier, a mother's accurate recall of a child's age at death is problematic. In particular, an infant may simply be reported as being one year old at time of death instead of 11 or 13 months. This problem of age heaping when reporting deaths appears to occur with the retrospective data on migrant children. On the basis of current U.S. age patterns of mortality, one would expect to find a much greater decline in mortality between infancy and age two than is represented by the sample data.

In order to obtain a more accurate reflection of infant mortality, a model life table (Coale-Demeny Model West, Level 21) is matched within one standard error of the sample estimate of cumulative survival by age five.[4] Matching cumulative mortality by age five minimizes the problem that age

heaping creates for reporting infant deaths. The cumulative mortality rates for this life table are presented in Column 2. The Q5 is 46 deaths per 1000 children, but infant mortality (Q1) in the model life table is 37 as compared to 29 in the migrant sample.

In 1978, the time of the survey, infant mortality in the U.S. was 14 per 1000, with cumulative mortality by age 5 at approximately 17 deaths (USDHEW, 1980). However, since 1965 is the mean birth year for children within the sample, 1965 may represent a more appropriate year from which to draw comparisons between the mortality experiences of migrant children and the U.S. population in general. As presented in Column 3, cumulative mortality in 1965 by age 5 was 29 per 1000 children for the U.S. population. The corresponding level of mortality among migrant children is 1.6 times greater. And whereas 25 infant deaths per 1000 births were expected in the U.S. population, migrant families experienced an estimated 37 deaths according to the model life table.[5]

Determinants of Migrant Childhood Mortality

Method of Analysis. Because information on age at death and/or date of birth was incomplete or not accurately reported, we have utilized a technique for analyzing childhood mortality with incomplete data that demographers devised for use in surveys conducted in developing countries (Trussell and Preston, 1981). In this method, one aggregates all information about the children of each mother, using the mother as the unit of analysis rather than each child. Thus, one examines child mortality among all children ever born to a woman.

When faced with incomplete data, a demographic standard or model must be located which will represent the expected rate of mortality. Model life tables can serve as such a standard. In the previous section, a Coale-Demeny Model West life table was used to provide a better estimate of infant and child mortality for migrant families in Wisconsin. When using a model life table to analyze determinants of mortality, one assumes that differences in mortality levels within the sample are proportional to the standard. While the level of mortality may differ by a given set of determinants, the age pattern of mortality in the model life table is assumed to apply to everyone.

For each mother, a ratio of the observed to expected proportion dead among her children was calculated. Survey information on the date of birth of each child is combined with a Model West life table to calculate the expected value. The model life table provides the cumulative probability of dying at each age. The actual age, or potential age for children who died, up to 5 years is calculated from the date of birth.[6] The ratio of observed to expected dead forms the Trussell-Preston index which is used as the dependent variable in a weighted least squares analysis of the determinants of childhood mortality.

The index value assigned each woman is weighted by a factor which is the number of children born to her divided by the average number born to women in the entire sample. This sample of childbearing women had an average of 4.68 children. The mean value of the weighted index represents the ratio of observed to expected mortality in the entire sample. This should be close to unity since observed mortality should match expected mortality within a population if an appropriate schedule of mortality has been used (see Farah and Preston, 1982). The index computed for this

sample has a mean value of 1.02. Thus, the model life table used in calculating the index appears to accurately reflect average childhood mortality for the migrant sample.

This index is a proportionality factor. It does not represent the probability of a child dying. Instead it represents the extent to which a woman's experience with childhood mortality among her offspring is proportionately greater or less than expected given the standard childhood mortality for the population. Mothers with values greater than one have a higher level of child mortality than would be expected. Unless the population is one of high mortality and fertility, the death of even one child will create an index value greater than one. In our sample 18 out of 132 women, or 14 percent, experienced the death of one or more of their children.

Determinants. We identified characteristics of the mother that affect levels of infant and child mortality, including mother's age at first birth, educational attainment, and smoking habits. English comprehension was also examined because of the unique characteristics of this population. In addition, we also examined mother's history of low birth weight children and experience with birthing out of the hospital. The means and standard deviations of these variables, both unweighted and weighted, are reported in Table 7.

Research has indicated that women who begin their childbearing at a young age experience higher levels of mortality among their children. In the United States, rates of mortality for infants and children under 5 years of age are reported to be higher among teenage mothers (Bouvier and vander Tak, 1976:23; Baldwin 1976:25; Nortman, 1974). Consequently some researchers have argued that teenage mothers are not only biologically

immature, but too socially immature to be responsible parents (Nortman, 1974). Presumably very young mothers are not as prepared nor have the resources to obtain the pre- and post-natal care needed by children. However, one might also argue that the life chances of children born to very young mothers are more a function of a supportive sociocultural context than of the mother's age per se (Baldwin and Cain, 1980). Therefore, one may not expect to find a higher rate of childhood mortality among younger mothers in cultures where childbearing normally begins at a very young age. The median age at first birth in this sample is just under 20 years of age, compared to a median age of at least 22 years for all women in the United States (Glick, 1977).

Maternal education appears to differentiate child mortality levels in a variety of settings (e.g. Slesinger and Travis, 1975; Caldwell, 1979; Preston, 1978; Farah and Preston, 1982). Improving the educational level of women is often seen as a means of reducing child mortality and has additional benefits for the society as well. In the sample of migrant women, education levels are extremely low by contemporary standards of education in the U.S. The median education level for the migrant women is less than eight years of school; only seven percent of the sample completed high school. In 1977, over 70 percent of all 15 through 44 year old women in the U.S. had completed high school (U.S. Bureau of the Census, 1978).

Among Spanish-speaking people in the U.S., an understanding of English is an important resource in facilitating access to social institutions in which English comprehension is often taken for granted. In this sample, only 46 percent of the women report comprehending English. We expect that women who understand English will have a lower level of mortality among their children.

A woman's smoking habits may also affect the life chances of her children. Smoking increases the chances of a premature birth, thereby placing infants at a greater risk of dying (Weeks, 1981:137). Smoking habits of the mother during pregnancy were not assessed in this survey. But as a proxy, women were questioned at the time of the survey as to whether they were smokers or non-smokers. Approximately 14 percent of the mothers reported that they were smokers which compares to 35 percent of U.S. women aged 20 to 44 in 1978 (USDHEW, 1979:120).

Birth weight is often argued to be the most important factor affecting infant mortality (Shapiro et al., 1968; Slesinger and Travis, 1975). Low birth weight is less common among children born to women of Mexican heritage (NCHS, 1983). Of the 629 children in this sample, 5.6 percent were reported to have been of low birth weight (i.e., less than 2500 grams). Among 22 reporting states in 1980, 5.6 percent of children born to women of Mexican heritage were also of low birth weight, as compared to 6.9 percent among all races (NCHS, 1983).

Access to medical care is believed to reduce the probability of infant mortality (Kessner et al., 1973). Thus childbirth in a hospital is expected to be associated with lower mortality levels than childbirth outside a hospital. Over 40 percent of the mothers in the survey experienced at least one out-of-hospital birth, and over 23 percent gave birth to at least half their children outside a hospital. In the United States less than 3 percent of births during 1965 occurred out of the hospital (U.S. Bureau of the Census, 1981:61).

Results. Because older women have experienced a larger proportion of their childbearing years than younger women and hence have a greater exposure to the risk of mortality among their offspring, it is important to control for mother's age in the analysis. One may decompose mother's age into two components--age at first birth and the number of years elapsed since first birth:

Mother's Age = (Age at first birth) + (Years since first birth)

The latter component more accurately reflects a woman's exposure to the risk that one of her children will die since it is based on the actual beginning of her childbearing experience (i.e., the beginning of her time at risk).[7]

Most of the variables are related to the dependent variable in the predicted direction. Table 8 presents coefficients from weighted least squares regression of the child mortality index on all independent variables. The tests of significance indicate that only three variables have a statistically significant net effect. We find that smoking habits, English comprehension, and experience of at least one low birth weight child affect the level of childhood mortality. Maternal education and out-of-hospital birth experience, net of other variables in the model, do not significantly differentiate childhood mortality experience among migrant workers.

One may interpret the coefficients presented in Table 8 as reflecting proportionate increases or decreases in the level of childhood mortality experienced by migrant women (Farah and Preston, 1982). Thus, English comprehension is associated with a reduction of 0.70 in the proportion who have died among children ever born to a woman. In other words, women who comprehend English experience a mortality level among their children that

is 70 percent lower than women who do not understand English. In contrast to the effects of English comprehension, maternal smoking habits increase the expected level of mortality among a woman's children by 169 percent. And mothers of at least one low birth weight child can be expected to have an 80 percent higher level of mortality among their children than those who have had no low birth weight children. Because of the small sample size problem noted earlier, these estimates should be viewed cautiously. In order to increase confidence in such estimates, future studies will have to be done using much larger samples.

SUMMARY AND DISCUSSION

Access to medical care is not equally available to all groups in the United States. Moreover, certain minority groups are at higher risk of childhood health problems and mortality. One such group consists of families in the migrant agricultural work force, whose members are hidden from the standard health and mortality studies based on vital statistics registration and nationally representative survey data. Our analysis of preventive medical care, morbidity, and mortality among children of migrant workers supports the view that this group is at substantially greater risk of health problems and early mortality than the general population.

In comparing the sample of migrant children to all children in the United States, we are acutely aware of the limitations of this exploratory research. Our analysis is based on a representative sample of migrant workers in Wisconsin, albeit a relatively small population. More precise comparisons would require surveys of nationally representative samples of children in both the general and migrant populations. However, the difficulties of obtaining an adequate national sample of migrant families

are presently insurmountable.

This survey of migrant workers in Wisconsin showed that fewer than half of migrant children under age 16 received the recommended annual physical checkup. Only one-third of migrant children under age 16 had received an annual dental checkup, compared to 50 percent of children in the total population. A rough comparison between levels of chronic health conditions for migrant children and those reported for children in a national survey suggests that the incidence of chronic conditions is several times greater among migrant children. Childhood mortality appears to be 1.6 times higher than in the total U.S. population.

In our effort to assess variation in morbidity among migrant children, neither age nor sex differences in the incidence of chronic conditions was apparent. But a higher incidence of chronic conditions appears for children whose mothers speak English. We suggest that this association may simply reflect the mother's ability to recognize or label illnesses. This implies that the level of chronic conditions may be under-reported, since half of the mothers neither read nor speak English.

Analysis of preventive care includes both immunizations and checkups. Younger children were more likely to receive checkups, while older children were more likely to receive immunizations. In part, this difference is based on exposure time. The measure of checkups referred to only the past year, while immunizations were open-ended with respect to time. If longer exposure time alone were to account for the higher immunization levels among older children, one would expect a constant increase with age. However, the level of immunizations sharply increases at 3 to 5 years of age.

We suggest distinguishing between two types of preventive care: one under the direct control of the family, and one controlled by the schools. Older children are more likely to be immunized because most immunizations are given to migrant children in schools.

It is also interesting to contemplate the differences between the experiences of migrant and nonmigrant children. While checkups and immunizations appear to be two separate types of preventive care for migrant children, we suspect that they are often linked for nonmigrant children. That is, when nonmigrant children receive a checkup, the physician is more likely to provide the immunizations indicated by the health records maintained for that child.

When analyzing preventive care, we note that the correlates of mother's characteristics reported in the literature, such as educational attainment, do not seem to apply to migrant mothers. After controlling for age of the child, no significant association was found between preventive care and any characteristics of the mother. We suggest that this may be understood by noting the truncated educational experience of these mothers. Only 7 percent of the migrant mothers had completed high school. Consequently, the variance in mother's education was among elementary school grades, which may not be the level of education that distinguishes between users and nonusers of preventive care. Family income, another characteristic usually associated with health care practices, was not used in this study because nearly all families were living below the poverty level.

In analysis of childhood mortality, the level of mortality was proportionally lower among women who spoke English, and higher among those who gave birth to a low birth weight child. But, surprisingly, the most important characteristic related to loss of children was whether a mother smoked. Since we had anticipated that smoking behavior increased the likelihood of prematurity (Weeks, 1981), we expected that the connection of smoking to childhood mortality would be minor when controlling for maternal experience with low birth weight children. However, the relationship did not disappear. We suggest that the relationship between smoking and child mortality may be behavioral rather than physiological. Further research might consider smoking as an example of high-risk behavior. Recent research reports that women who smoke are higher risk-takers in other forms of behavior (Vogt, 1984), and thus might be less likely to seek preventive medical care for themselves and their children.

Several methodological problems emerged in conducting this exploratory research (e.g., small sample size and accuracy of retrospective reporting of fertility). Our analysis indicates the need to identify the societal institutions that regulate children's use of different types of preventive care. We cannot assume that the parents exercise total control over the health care delivered to their children. Head Start programs, school systems, public health systems, migrant health services, and other social and medical institutions are all actors in the preventive health care (and particularly the immunizations) given to migrant children. In addition, future studies of children's health should give closer attention to the impact of parental risk-taking behaviors on childhood morbidity and mortality experiences.

FOOTNOTES

1. The resulting sample consists of all married women under age 50 living in the sampled workers' households.

2. Current estimates of the effect of the 1981 "Student Immunization Law" in Wisconsin now indicate that 97 percent of all students entering kindergarten during the school year are immunized. No data are available, however, on migrant children who may attend school in Wisconsin only in the summer (Wisconsin Division of Health, 1984).

3. Over two-thirds of the migrants sampled received some form of public assistance (Slesinger, 1979a).

4. The model life tables are divided into four regions to correspond to variations in age patterns of mortality. Model West life tables are selected as the most appropriate for this sample of children. Within regions, 24 levels of model life tables represent high-to-low mortality regimes. The 21st level of the model west life table corresponds most closely to the cumulative mortality by age 5 in the sample.

5. In a clinical study of migrant farm children in Colorado, Chase et al., (1971) report an infant mortality rate of 63 per 1000 live births. This rate is based on the childbearing histories of the mothers of Mexican-American children who voluntarily attended a Colorado health clinic over a two-month period in 1969. The representativeness of the families on which this mortality rate is calculated is uncertain. However, Chase et al., report the mothers have comparable social characteristics (e.g., education, family income, etc.) to a sample of 3,500 Mexican-American migrant families studied by the Colorado Migrant Council.

6. According to the formula used in this analysis, Pi is a proportionality factor, where Pi = Oi/Ei, and Oi = observed number of deaths among children born to woman i. And

$$E_i = \Sigma\ B_i(a)Q^s(a)$$

The Qs(a) refers to the cumulative mortality based on the standard or model life table used in the analysis. Note that we have restricted analysis to mortality by age 5 since the analysis focuses on childhood mortality. Our sample is clearly too small to analyze mortality at older ages. Further, one would expect the determinants of mortality to be very different for older ages. This age restriction also makes it easier to deal with a few cases for which there is missing data on births. For example, dates of birth were missing for six children who had died before age 5 in a family of 15 children. Since the mother was over 45 years old and had begun her childbearing at age 14, we assumed that it was highly probable that these six children had indeed been born at least five years ago. Accordingly, they were assigned a potential exposure time of five years. If the five-year restriction had not been imposed, no reasonable assumption could

have been made regarding the actual date of birth.

7. The Trussell-Preston method assumes that mortality rates have not changed over time. Our sample is too small to evaluate cohort changes in mortality experiences. We have attempted to adjust for such a time bias by controlling on "years since first birth" for each woman.

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Table 1. Percent of Children Immunized Against Selected Diseases, and Receipt of Tuberculin Skin Test, by Age of Child in 1978 (N=330)

Disease	Age of Child				
	Under 3	3-5	6-11	12-15	Total
DPT	77.4%	90.6%	88.2%	91.4%	87.6%
Polio	74.2	94.3	89.1	92.4	88.2
Measles	50.0	88.7	86.4	91.4	81.5
Rubella	50.0	90.6	82.7	89.5	80.0
Small pox	45.2	75.5	80.9	89.5	76.1
Mumps	43.5	73.6	71.8	81.9	70.0
TB Test	37.1	69.8	83.6	85.7	73.3

Table 2. Length of Time Since Last Well Checkup by Age of Child (N=330)

Time Since Last Checkup	Age of Child				
	Under 3	3-5	6-11	12-15	Total
Less than 1 year	51.6%	54.7%	47.3%	32.4%	44.5%
1 - 2 years	11.3	18.9	14.5	22.9	17.3
2 or more years	6.5	5.7	4.5	8.7	6.5
Never	22.6	15.1	20.9	17.1	19.1
Don't know	8.1	5.7	12.7	19.1	12.7
Total	100.1%	100.1%	99.9%	100.2%	100.1%

Table 3. Length of Time Since Last Dental Visit by Age of Child

Time Since Last Dental Visit	Age of Migrant Child					U.S. 1981[a]
	Under 3	3-5	6-11	12-15	Total Under 16	Total Under 17
Less than 1 year	11.3%	47.2%	45.5%	30.5%	34.5%	50.0%
1 - 2 years	3.2	15.1	17.3	26.7	17.3	10.8
2 or more years	0.0	0.0	5.4	10.6	5.1	8.0
Never	72.6	34.0	23.6	21.9	33.9	30.4
Don't know	12.9	3.8	8.2	10.5	9.1	0.8
Total	100.0%	100.1%	100.0%	100.2%	99.9%	100.0%

[a]Derived from NCHS, 1982:29

Table 4. Chronic Conditions Reported by Mother

	Number of Children
Trouble breathing	11
Asthma	3
Trouble hearing	10
Heart trouble	3
Rheumatic fever	2
Orthopedic condition	3
Anemia	2
Diabetes	2
Other[a]	4

[a]Sinus, speech trouble, convulsions, lack of appetite

Table 5. Correlations Among Mother and Child Characteristics and Health Measures.

Independent Variables	Preventive Medical Care				Morbidity
	Checkup in Past Year	Dental Exam In Past Year	Immunizations and Tests		Chronic Condition
			Six	Two	
Number	(327)	(266)	(259)	(317)	(330)
Mother's Age	-.163**	-.104*	.172**	.142**	-.027
Mother's Education	.013	.026	-.087	.006	.073
Mother's English Comprehension	-.035	.006	-.024	.125*	.104*
Child's Age	-.168***	-.131*	.182**	.226***	-.024
Child's Sex	.029	.023	.029	-.049	-.004

*p < 0.05
**p < 0.01
***p < 0.001

Table 6. Cumulative Probability of Dying

	Migrant	Model West Life Table[a]	U.S. 1965[b]
Q_1	.029	.037	.025
Q_2	.045	.044	.026
Q_5	.046	.046	.029

[a]Probabilities computed using Q = 1-Lx. The life table for the total population was computed by adding the female Lx to a weighted male Lx and dividing by 2. The male Lx was weighted by 1.05 to account for the sex ratio at birth. Source: Coale and Demeny, 1966.

[b]Probabilities computed using Q = 1-Lx. Source: USDHEW, 1967.

Table 7. Means and Standard Deviations (Weighted & Unweighted) for the Mortality Index and Independent Variables (N = 132 mothers)

	Unweighted		Weighted	
	Mean	Standard Deviation	Mean	Standard Deviation
Mortality Index	.5819	1.6178	1.0170	2.0580
Years Since First Birth	14.4697	9.1921	19.3640	3.7830
Mother's Age at First Birth	20.4773	4.4318	19.8360	3.7830
Mother's Education[a]	1.8326	.9279	1.5460	.8605
Mother's English Comprehension[b]	.4621	.5005	.3577	.4811
Mother's Smoking Habits[c]	.1439	.3524	.1844	.3893
Low-Birth Weight Children[d]	.1591	.3672	.1955	.3981
Proportion Children Born out of Hospital	.2864	.3806	.3459	.3654
Mother's Age	34.9242	9.1632	39.1955	7.8194

[a]Mother's education is coded: 0=none; 1=1-4 years; 2=5 to 8 years; 3=9 to 11 years; 4=12 or more years. Missing data replaced by mean education based on mother's age.

[b]1=mother speaks or reads English; 0=mother does not speak or read English.

[c]1=mother smokes cigarettes, cigars or pipe; 0=mother does not smoke.

[d]1=mother gave birth to at least one low birth weight child; 0=none of mother's births were low birth weight.

Table 8. Weighted Least Squares Analysis of Child Mortality[a] Among Migrant Women

Independent Variables	Beta Coefficients	Standard Error
Years since First Birth	.033	.022
Age at First Birth	-.045	.046
Education	-.120	.215
English Comprehension	-.699*	.396
Smoking Habits	1.685***	.442
Any Low-Birth-Weight Children	.802*	.424
% Children Born out of Hospital	-.670	.494
Constant	1.470	
R^2	.250	

* $p < .10$ level
*** $p < .01$ level

[a]Dependent variable is ratio of observed-to-expected deaths by age 5. Women are weighted by number of births over average number births.

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Figure 1

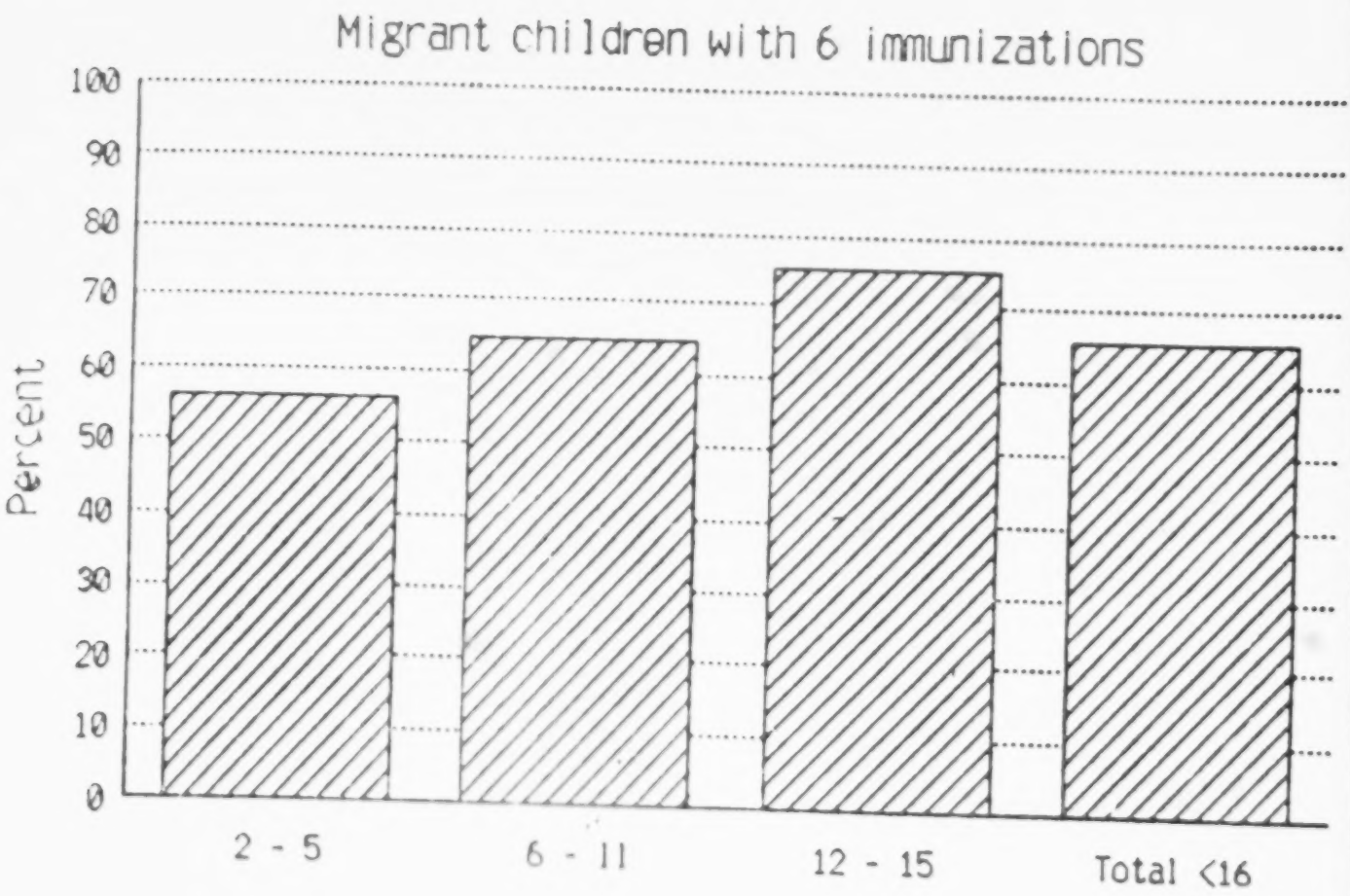
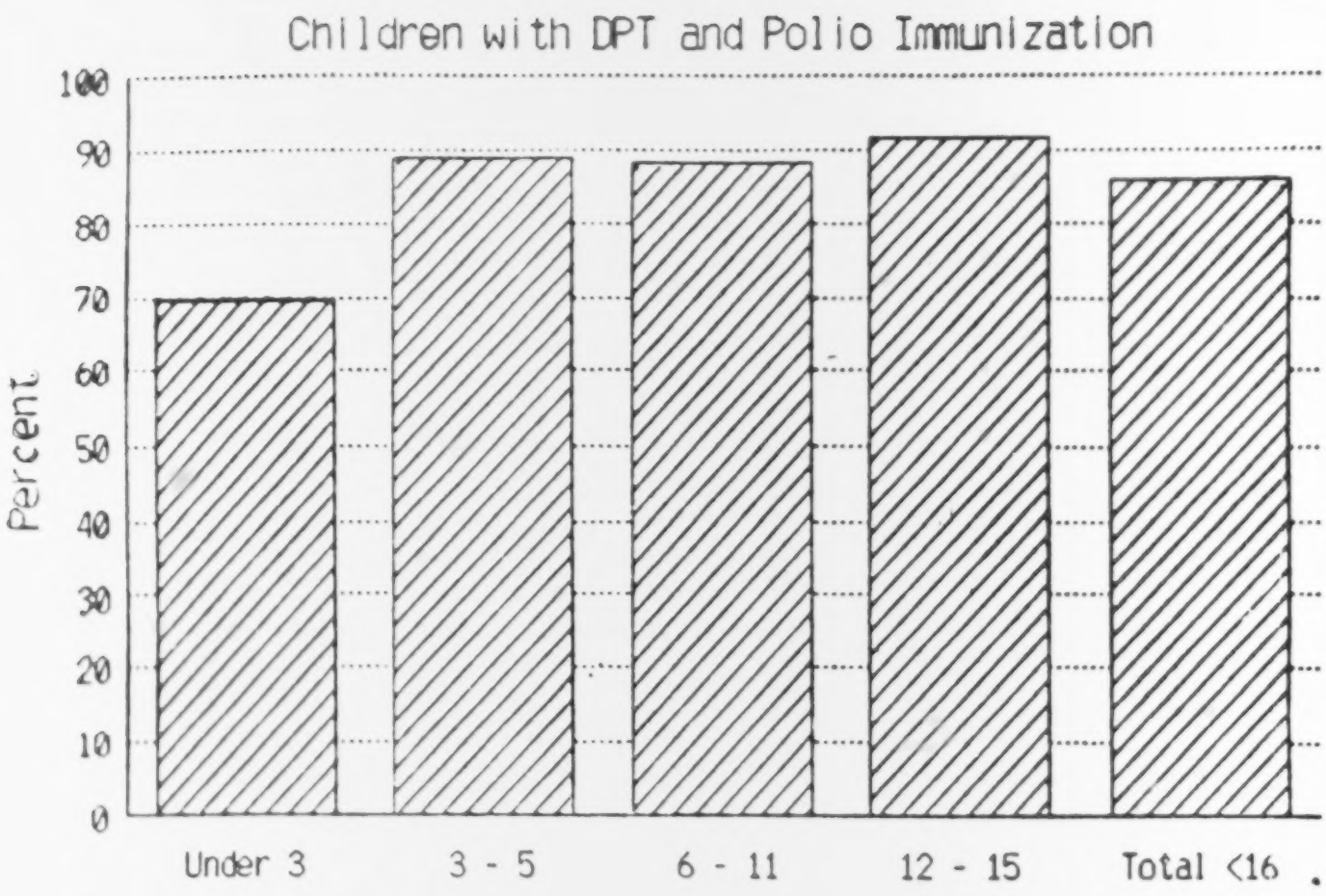

Migrant children with 6 immunizations
Percent
100
90
80
70
60
50
40
30
20
10
0
2 - 5
6 - 11
12 - 15
Total <16

Figure 2


Children with DPT and Polio Immunization
Percent
100
90
80
70
60
50
40
30
20
10
0
Under 3
3 - 5
6 - 11
12 - 15
Total <16